

CLAIMS

1. A method of actuating a deployment of a vehicle airbag during an impact event of a vehicle, the method comprising:
 - providing a vehicle impact sensor having a plurality of sensor elements, each of the plurality of elements adapted to generate an impact sensor signal having a sensor signal value indicative of a severity level of the impact event;
 - receiving an impact sensor signal from each element during the impact event of the vehicle;
 - summing the sensor signal values of the impact sensor signals to define an aggregate sensor signal value;
 - determining a number of impact sensor signals having respective sensor signal values greater than an active sensor element threshold value to define a number of active sensor elements;
 - determining a threshold aggregate sensor signal value based on the number of active sensor elements; and
 - generating an actuating signal for deploying the vehicle airbag, when the aggregate sensor signal value is greater than the threshold aggregate sensor signal value.
2. The method of claim 1 further comprising conditioning the impact sensor signals with a low-pass filter to define filtered signals corresponding to the impact sensor signals, before summing the sensor signal values.

3. The method of claim 2 wherein summing the sensor signal values includes summing the sensor signal values of the filtered signals to define the aggregate sensor signal value.
4. The method of claim 2 further comprising conditioning the aggregate sensor signal value with a high-pass filter, after summing the sensor signal values.
5. The method of claim 1 further comprising:
 - providing a nominal activation threshold representing a predetermined value for the number of active elements at nominal conditions; and
 - adjusting the nominal activation threshold based on environmental factors to define the active element threshold value.
6. The method of claim 5 wherein the environmental factors include temperature, humidity, and pressure during the impact event.
7. The method of claim 1 further comprising:
 - comparing each sensor signal value with the active element threshold value;
 - and
 - summing the sensor signal values that are greater than the active element threshold value.
8. The method of claim 1 further comprising comparing the aggregate sensor signal value with the threshold aggregate sensor signal value.

9. The method of claim 1 wherein each element is a bend sensitive resistance element.

10. The method of claim 9 wherein the bend sensitive resistance element is disposed on a flexible substrate.

11. A method of actuating a deployment of a vehicle airbag during an impact event of a vehicle, the method comprising:

providing a vehicle impact sensor having a plurality of elements, each element adapted to generate an impact sensor signal having a sensor signal value representing a level of impact;

receiving an impact sensor signal from each element during the impact event of the vehicle;

determining an aggregate sensor signal value based on a summation of the sensor signal values of the impact sensor signals;

determining a threshold aggregate sensor signal value based on a number of elements having impact sensor signals with sensor signal values greater than an active element threshold value;

generating an actuating signal for deploying the airbag, when the aggregate sensor signal value is greater than the threshold aggregate sensor signal value.

12. The method of claim 11 wherein determining the aggregate sensor signal value includes summing the sensor signal values of the impact sensor signals to define the aggregate sensor signal value.
13. The method of claim 11 further comprising determining the number of impact sensor signals having respective sensor signal values greater than the active element threshold value to define the number of active elements.
14. The method of claim 11 further comprising low-pass filtering the impact sensor signals to define filtered signals corresponding to the impact sensor signals, before summing the sensor signal values.
15. The method of claim 14 wherein summing the sensor signal values includes summing the sensor signal values of the filtered signals to define the aggregate sensor signal value.
16. The method of claim 14 further comprising high-pass filtering the aggregate sensor signal value, after summing the sensor signal values.
17. The method of claim 11 further comprising:
- providing a nominal activation threshold representing a predetermined value for the number of active elements at nominal conditions; and
 - adjusting the nominal activation threshold based on environmental factors to define the active element threshold value.

18. The method of claim 17 wherein the environmental factors include temperature, humidity, and pressure during the impact event.

19. The method of claim 11 further comprising:
comparing each sensor signal value with the active element threshold value;
and
summing the sensor signal values that are greater than the active element threshold value.

20. The method of claim 11 further comprising comparing the aggregate sensor signal value with the threshold aggregate sensor signal value.

21. A method of determining an impact event of a vehicle for deployment of an airbag, the method comprising:
providing a vehicle impact sensor including an element adapted to generate an impact sensor signal having a sensor signal value representing a level of impact;
receiving an impact sensor signal from the element during the impact event of the vehicle, the sensor signal having a respective sensor signal value defining an aggregate sensor signal value;
determining whether the sensor signal value of the sensor signal is greater than an active element threshold value;

determining whether the aggregate sensor signal value is greater than the threshold aggregate sensor signal value, if the sensor signal value is determined to be greater than the active element threshold value; and

generating an actuating signal for deploying the airbag, if the aggregate sensor signal value is determined to be greater than the threshold aggregate sensor signal value.

22. The method of claim 21 further comprising low-pass filtering the impact sensor signal to define a filtered signal having the respective sensor signal value defining the aggregate sensor signal value.

23. The method of claim 22 further comprising high-pass filtering the aggregate sensor signal value.

24. The method of claim 21 further comprising:

providing a nominal activation threshold representing a preliminary value for the active element threshold value at nominal conditions; and

adjusting the nominal activation threshold based on environmental factors to define the active element threshold value.

25. The method of claim 24 wherein the environmental factors include temperature, humidity, and pressure during the impact event.

26. The method of claim 21 wherein each element is a bend sensitive resistance element.

27. The method of claim 26 wherein the bend sensitive resistance element is disposed on a flexible substrate.

28. A system for actuating a deployment of a vehicle airbag during an impact event of a vehicle, the system comprising:

a vehicle impact sensor having an element adapted to generate an impact sensor signal during the impact event, the sensor signal having a sensor signal value representing a level of impact and defining an aggregate sensor signal value; and

a processor in electrical communication with the impact sensor, the processor being capable of determining whether the sensor signal value of the sensor signal is greater than an active element threshold value and whether the aggregate sensor signal value is greater than the threshold aggregate sensor signal value,

wherein the processor is configured to generate an actuating signal for deploying the airbag, when the aggregate sensor signal value is determined to be greater than the threshold aggregate sensor signal value.